

II. CLAIM AMENDMENTS

Please cancel claims 29, 36-37, 39-40, 42, 50 and 52 without prejudice, amend claims 27-28, 38, 41, 43-49 and 53-54, and enter new claims 55-101, as set forth in the following listing of the claims.

1-26. (Cancelled)

27. (Currently Amended) A server having means for transmitting a data signal ~~having a sequence of data units in a predetermined order over a transmission link, the data units being sent in an order determined by their relative importance rather than their predetermined order, in which the data units are intended to be played back at scheduled playback times and are sent in an order determined by their relative importance in providing uninterrupted playback~~ the server further comprising re-ordering means for changing the order of primary and secondary data units in the sequence of data units by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data unit order in which the primary data unit precedes the secondary data unit in the sequence of data units, ~~t~~thereby increaseing the likelihood of ~~more important of that~~ the primary data units will being received at the client before in time to be played back at ~~their~~its scheduled playback times and decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time in a situation where the available bandwidth of the transmission link is reduced.

28. (Currently Amended) A server according to claim 27, in which the primary data units represent a base layer and the secondary data units represent at least one enhancement layer.

29. (Cancelled).

30. (Currently Amended) A server according to claim 27, in which the data signal is scalable.

31. (Currently Amended) A server according to claim 30, in which the signal is scalable in a domain selected from a group consisting of the temporal, the spatial, the spectral and the SNR domains.

32. (Currently Amended) A server according to claim 27, which comprises an editor for providing the data signal.

33. (Currently Amended) A server according to claim 27, in which the data signal represents a sequence of pictures to produce a moving image.

34. (Currently Amended) A server according to claim 33, in which the data signal represents a video sequence.

35. (Currently Amended) A server according to claim 27, in which the data signal comprises multimedia data.

36-37. (Cancelled)

38. (Currently Amended) A data transmission system including a server for transmitting a data signal having a sequence of data units in a predetermined order over a transmission link between from a the data source server and to a data sink client for playback at the client, the data signal comprising a sequence of data units including primary data units and secondary data units, each of the primary and secondary data units having a scheduled playback time at the client, receipt of the primary data units at the client in time to be played back at their scheduled playback times providing pause-less playback of the data signal at the client, receipt of the secondary data units at the client in time to be played back at their scheduled playback times improving the quality of the data signal played back at the client, the primary and secondary data units being ordered in the data signal according to an original data unit order, the system comprising re-ordering means to for changing the order the primary and secondary data units into an order determined by their relative importance rather than their predetermined order and transmitting means to transmit the re-order data units, the re-ordering means being arranged to re-order the data units according to pre-calculated scheduled playback times so that those data units that are necessary to provide uninterrupted playback are intended to be received before their pre-calculated scheduled playback times in the sequence of data units by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data unit order in which the primary data unit precedes the secondary data unit in the sequence of data

units, thereby increasing the likelihood that the primary data unit will be received at the client in time to be played back at its scheduled playback time and decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time.

39-40. (Cancelled)

41. (Currently Amended) A data transmission system according to claim 38, in which the ~~source-iss~~server comprises an editor for providing a scalable data signal.

42. (Cancelled)

43. (Currently Amended) A data transmission system according to claim 38, in which the ~~sink~~client is a mobile terminal.

44. (Currently Amended) A data transmission system according to claim 38, in which the ~~sink~~client is a mobile telephone.

45. (Currently Amended) A data transmission system according to claim 38, in which means are provided to check the progress of transmission and to change the data unit order being used to one better suited to available bandwidth.

46. (Currently Amended) A method of transmitting a data signal ~~having a sequence of data units in a predetermined order over a transmission link between~~from a data source server and to a data sink client for playback at the client, the data signal comprising a sequence of data units including primary data units and secondary data units, each of the primary and secondary data units having a scheduled playback time at the client, receipt of the primary data units at the client in time to be played back at their scheduled playback times providing pause-less playback of the data signal at the client, receipt of the secondary data units at the client in time to be played back at their scheduled playback times improving the quality of the data signal played back at the client, the primary and secondary data units being ordered in the data signal according to an original data unit order, the method comprising the steps of:

~~calculating scheduled playback times for the data units and re-ordering the data units into an order determined by their relative importance rather than their predetermined order so that those data units that are necessary to provide uninterrupted playback are intended to be received before their pre-calculated scheduled playback times~~transmitting the re-ordered data units changing the order of primary and secondary data units in the sequence of data units by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data unit order in which the primary data unit precedes the secondary data unit in the sequence of data units, thereby increasing the likelihood that the primary data unit will be received at the client in time to be played back at its scheduled playback time and

decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time.

47. (Currently Amended) A method of transmitting a data signal according to claim 46, in which the primary and secondary data units are returned to their original ~~sequence~~data unit order once they have been transmitted over the transmission link.

48. (Currently Amended) A method of transmitting a data signal according to claim 46 ~~in which~~comprising checking the progress of transmission is checked and changing the data unit order being used is changed to one better suited to available bandwidth.

49. (Currently Amended) A computer program product stored on a computer usable medium comprising:

computer readable program means for causing transmission of a data signal ~~having a sequence of data units in a predetermined order over a transmission link between~~from a data source server and to a data sink client for playback at the client, the data signal comprising a sequence of data units including primary data units and secondary data units, each of the primary and secondary data units having a scheduled playback time at the client, receipt of the primary data units at the client in time to be played back at their scheduled playback times providing pause-less playback of the data signal at the client, receipt of the

secondary data units at the client in time to be played back at their scheduled playback times improving the quality of the data signal played back at the client, the primary and secondary data units being ordered in the data signal according to an original data unit order, and

the computer program product further comprising:

computer readable program means to re-order the data units according to pre-calculated scheduled playback times so that those data units that are necessary to provide uninterrupted playback are intended to be received before their pre-calculated scheduled playback times. for changing the order of primary and secondary data units in the sequence of data units by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data unit order in which the primary data unit precedes the secondary data unit in the sequence of data units, thereby increasing the likelihood that the primary data unit will be received at the client in time to be played back at its scheduled playback time and decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time in a situation where the available bandwidth of the transmission link is reduced.

50. (Cancelled)

51. (Currently Amended) A computer program product according to claim 49, comprising an editor for providing a scalable data signal.

52. (Cancelled)

53. (Currently Amended) ~~A data signal having a sequence of data units for transmission over a transmission link between a data source and a data sink, the data units being intended to be played back at pre-calculated scheduled playback times and being sent in an order determined by their relative importance so that those data units that are necessary to provide uninterrupted playback are intended to be received before their pre-calculated scheduled playback times~~ comprising a sequence of data units including primary data units and secondary data units, each of the primary and secondary data units having a scheduled playback time, receipt of the primary data units at a client in time to be played back at their scheduled playback times providing pause-less playback of the data signal at the client, receipt of the secondary data units at the client in time to be played back at their scheduled playback times improving the quality of the data signal played back at the client, an order of the primary and secondary data units in the sequence of data units having been changed with respect to an original data unit order by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data

unit order in which the primary data unit precedes the secondary data unit in the sequence of data units, thereby increasing the likelihood that the primary data unit will be received at the client in time to be played back at its scheduled playback time and decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time.

54. (Currently Amended) A re-ordering device for re-ordering a data signal, the data signal being for transmission over a transmission link, ~~between~~from a data source ~~server~~ and to a data ~~sink~~ client for playback at the client, the data signal ~~having a~~ sequence of data units in a predetermined order, the data units being intended to be played back at scheduled playback times comprising a sequence of data units including primary data units and secondary data units, each of the primary and secondary data units having a scheduled playback time at the client, receipt of the primary data units at the client in time to be played back at their scheduled playback times providing pause-less playback of the data signal at the client, receipt of the secondary data units at the client in time to be played back at their scheduled playback times improving the quality of the data signal played back at the client, the primary and secondary data units being ordered in the data signal according to an original data unit order, the re-ordering device being arranged to re-order the data units according to pre-calculated scheduled playback times into an order determined by their relative importance rather than their predetermined order so that those data units that are necessary to provide uninterrupted playback are intended to be received before their pre-calculated scheduled playback times change the order the primary and secondary data units in the

sequence of data units by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data unit order in which the primary data unit precedes the secondary data unit in the sequence of data units, thereby increasing the likelihood that the primary data unit will be received at the client in time to be played back at its scheduled playback time and decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time.

55. (New) A server according to claim 27, wherein the re-ordering means is arranged to:

- calculate an average bit-rate for the data signal, said average bit-rate comprising an average bit-rate for the primary data units and an average bit-rate for the secondary data units;
- calculate a buffering time required at the client for full quality playback of the data signal at the client when the data units are transmitted over the transmission link from the server to the client in the original data unit order at a full transmission rate equal to the average bit-rate of the data signal, full quality playback of the data signal at the client occurring when all of the primary data units and all of the secondary data units in the data signal are received at the client in time to be played back at their scheduled playback times;

- calculate a buffering time required at the client for reduced quality playback of the data signal at the client, when the data units are transmitted over the transmission link from the server to the client in the original data unit order at a reduced transmission rate less than the average bit-rate of the data signal, reduced quality playback of the data signal at the client occurring when all of the primary data units are received at the client in time to be played back at their scheduled playback times and some or all of the secondary data units are received at the client too late to be played back at their scheduled playback times;
- a). shift the position of each primary data unit in the sequence of data units towards the beginning of the sequence of data units, so that where a primary data unit is preceded by a secondary data unit in the sequence of data units, the positions of the primary and secondary data units are exchanged, thereby producing a re-ordered data signal with a modified data unit order different from the original data unit order;
- b). repeat the step of calculating the buffering time required at the client for full quality playback of the data signal assuming the data units are transmitted over the transmission link from the server to the client in the modified data unit order;
- c). repeat the step of calculating the buffering time for reduced quality playback of the data signal at the client assuming the data units are transmitted from over the

transmission link from the server to the client in the modified data unit order; and

- repeat steps a), b) and c) until the buffering time required for full quality playback at the client is greater than or equal to the buffering time for reduced quality playback of the data signal at the client.

56. (New) A server according to claim 55, wherein the re-ordering means is arranged to calculate the buffering time for full quality playback of the data signal at the client by:

- d). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate of the data signal;
- e). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data to determine whether the first data unit will be received at the client in time to played back at its scheduled playback time;
- f). if the first data unit will be received at the client too late to be played back at its scheduled playback time, increasing the buffering time so that the first data unit should be received in time; and
- repeating steps d), e) and f) for each subsequent data unit of the data signal in turn.

57. (New) A server according to claim 55, wherein the re-ordering means is arranged to calculate the buffering time for reduced quality playback of the data signal at the client by:

- g). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate for the primary data units plus a certain percentage of the average bit-rate for the secondary data units;
 - h). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data unit to determine whether the first data unit will be received at the client in time to be played back at its scheduled playback time;
 - i). if the first data unit will be received at the client too late to be played back at its scheduled playback time, increasing the buffering time so that the first data unit should be received in time; and
- repeating steps g), h) and i) for each subsequent data unit of the data signal in turn.

58. (New) A server according to claim 27, wherein the re-ordering means is arranged to estimate an expected reduced link transmission rate in advance.

59. (New) A server according to claim 27, wherein the re-ordering means is arranged to estimate an expected reduced link transmission rate based on the behaviour of the transmission link.

60. (New) A server according to claim 27, wherein the re-ordering means is arranged to re-order the data signal to produce re-ordered data signals for several alternative transmission rates.

61. (New) A server according to claim 27, wherein the re-ordering means is arranged to adjust the sequence of data units dynamically whilst transmission is occurring.

62. (New) A server according to claim 27, wherein the re-ordering means is further arranged to replace some of the primary data units with secondary data units before changing the order of the primary and secondary data units.

63. (New) A server according to claim 27, wherein the re-ordering means is arranged to re-order the data units of a data signal for transmission over a transmission link having a data transmission bandwidth that would otherwise be insufficient for transmitting the data signal.

64. (New) A server according to claim 27, wherein the re-ordering means is arranged to re-order the data units of a data signal for transmission over a transmission link so as to make a

certain portion of an available bandwidth available for transmission of other data.

65. (New) A server according to claim 27, wherein the data signal is a digital video signal, the primary data units comprise INTRA coded I frames and INTER coded P frames and the secondary data units are bi-directionally predicted B frames.

66. (New) A data transmission system according to claim 38, wherein the re-ordering means is arranged to re-order the data signal to produce re-ordered data signals for several alternative transmission rates and the data transmission system is arranged to switch to a re-ordered data signal better suited to a lower transmission rate if problems are encountered due to pauses in playback at the client.

67. (New) A data transmission system according to claim 38, wherein the data transmission system is arranged to check the progress of transmission and/or playback at the client during transmission and the re-ordering means is arranged to adjust the sequence of data units dynamically whilst transmission is occurring.

68. (New) A method of transmitting a data signal according to claim 46, comprising:

- calculating an average bit-rate for the data signal, said average bit-rate comprising an average bit-rate for

the primary data units and an average bit-rate for the secondary data units;

- calculating a buffering time required at the client for full quality playback of the data signal at the client when the data units are transmitted over the transmission link from the server to the client in the original data unit order at a full transmission rate equal to the average bit-rate of the data signal, full quality playback of the data signal at the client occurring when all of the primary data units and all of the secondary data units in the data signal are received at the client in time to be played back at their scheduled playback times;
- calculating a buffering time required at the client for reduced quality playback of the data signal at the client, when the data units are transmitted over the transmission link from the server to the client in the original data unit order at a reduced transmission rate less than the average bit-rate of the data signal, reduced quality playback of the data signal at the client occurring when all of the primary data units are received at the client in time to be played back at their scheduled playback times and some or all of the secondary data units are received at the client too late to be played back at their scheduled playback times;
- a). shifting the position of each primary data unit in the sequence of data units towards the beginning of the sequence of data units, so that where a primary data unit is preceded by a secondary data unit in the sequence of data units, the positions of the primary and secondary data

units are exchanged, thereby producing a re-ordered data signal with a modified data unit order different from the original data unit order;

b). repeating the step of calculating the buffering time required at the client for full quality playback of the data signal assuming the data units are transmitted over the transmission link from the server to the client in the modified data unit order;

c). repeating the step of calculating the buffering time for reduced quality playback of the data signal at the client assuming the data units are transmitted from over the transmission link from the server to the client in the modified data unit order;

- repeating steps a), b) and c) until the buffering time required for full quality playback at the client is greater than or equal to the buffering time for reduced quality playback of the data signal at the client.

69. (New) A method of transmitting a data signal according to claim 68, wherein the buffering time for full quality playback of the data signal at the client is calculated by:

d). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate of the data signal;

- e). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data to determine whether the first data unit will be received at the client in time to played back at its scheduled playback time;
- f). if the first data unit will be received at the client too late to be played back at its scheduled playback time, increasing the buffering time so that the first data unit should be received in time; and
- repeating steps d), e) and f) for each subsequent data unit of the data signal in turn.

70. (New) A method of transmitting a data signal according to claim 68, wherein the buffering time for reduced quality playback of the data signal at the client is calculated by:

- g). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate for the primary data units plus a certain percentage of the average bit-rate for the secondary data units;
- h). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data unit to determine whether the first data unit will be received at the client in time to be played back at its scheduled playback time;

i). if the first data unit will be received at the client too late to be played back at its scheduled playback time, increasing the buffering time so that the first data unit should be received in time; and

- repeating steps g), h) and i) for each subsequent data unit of the data signal in turn.

71. (New) A method of transmitting a data signal according to claim 46, comprising estimating an expected reduced link transmission rate in advance.

72. (New) A method of transmitting a data signal according to claim 46, comprising estimating an expected reduced link transmission rate based on the behaviour of the transmission link.

73. (New) A method of transmitting a data signal according to claim 46, comprising:

- re-ordering the data signal to produce re-ordered data signals for several alternative transmission rates; and
- switching to a re-ordered data signal better suited to a lower transmission rate if problems are encountered due to pauses in playback at the client.

74. (New) A method of transmitting a data signal according to claim 46, comprising checking the progress of transmission and/or playback at the client during transmission and adjusting the sequence of data units dynamically whilst transmission is occurring.

75. (New) A method of transmitting a data signal according to claim 46, further comprising replacing some of the primary data units with secondary data units, before changing the order of the primary and secondary data units.

76. (New) A method of transmitting a data signal according to claim 46, comprising applying the method to re-order the data units of a data signal for transmission over a transmission link having a data transmission bandwidth that would otherwise be insufficient for transmitting the data signal.

77. (New) A method of transmitting a data signal according to claim 46, comprising applying the method to re-order the data units of a data signal for transmission over a transmission link, so as to make a certain portion of an available bandwidth available for transmission of other data.

78. (New) A method of transmitting a data signal according to claim 46, wherein the data signal is a digital video signal, the primary data units comprise INTRA coded I frames and INTER coded P frames and the secondary data units are bi-directionally predicted B frames.

79. (New) A method of transmitting a data signal according to claim 46, wherein the data signal is a scalable data signal having a base layer and at least one enhancement layer.

80. (New) A method of transmitting a data signal according to claim 79, wherein the data signal is signal is scalable in a domain selected from a group consisting of the temporal, the spatial, the spectral and the SNR domains.

81. (New) A computer program product according to claim 49, comprising:

- computer readable program means for calculating an average bit-rate for the data signal, said average bit-rate comprising an average bit-rate for the primary data units and an average bit-rate for the secondary data units;
- computer readable program means for calculating a buffering time required at the client for full quality playback of the data signal at the client when the data units are transmitted over the transmission link from the server to the client in the original data unit order at a full transmission rate equal to the average bit-rate of the data signal, full quality playback of the data signal at the client occurring when all of the primary data units and all of the secondary data units in the data signal are received at the client in time to be played back at their scheduled playback times;

- computer readable program means for calculating a buffering time required at the client for reduced quality playback of the data signal at the client, when the data units are transmitted over the transmission link from the server to the client in the original data unit order at a reduced transmission rate less than the average bit-rate of the data signal, reduced quality playback of the data signal at the client occurring when all of the primary data units are received at the client in time to be played back at their scheduled playback times and some or all of the secondary data units are received at the client too late to be played back at their scheduled playback times;

a). computer readable program means for shifting the position of each primary data unit in the sequence of data units towards the beginning of the sequence of data units, so that where a primary data unit is preceded by a secondary data unit in the sequence of data units, the positions of the primary and secondary data units are exchanged, thereby producing a re-ordered data signal with a modified data unit order different from the original data unit order;

b). computer readable program means for repeating the step of calculating the buffering time required at the client for full quality playback of the data signal assuming the data units are transmitted over the transmission link from the server to the client in the modified data unit order;

c). computer readable program means for repeating the step of calculating the buffering time for reduced quality playback of the data signal at the client assuming the data

units are transmitted from over the transmission link from the server to the client in the modified data unit order; and

- computer readable program means for repeating steps a), b) and c) until the buffering time required for full quality playback at the client is greater than or equal to the buffering time for reduced quality playback of the data signal at the client.

82. (New) A computer program product according to claim 81, further comprising computer readable program means for calculating the buffering time for full quality playback of the data signal at the client by:

- d). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate of the data signal;
- e). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data to determine whether the first data unit will be received at the client in time to played back at its scheduled playback time;
- f). if the first data unit will be received at the client too late to be played back at its scheduled playback time, increasing the buffering time so that the first data unit should be received in time; and

- repeating steps d), e) and f) for each subsequent data unit of the data signal in turn.

83. (New) A computer program product according to claim 81, further comprising computer readable program means for calculating the buffering time for reduced quality playback of the data signal at the client by:

g). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate for the primary data units plus a certain percentage of the average bit-rate for the secondary data units;

h). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data unit to determine whether the first data unit will be received at the client in time to be played back at its scheduled playback time;

i). if the first data unit will be received at the client too late to be played back at its scheduled playback time, increasing the buffering time so that the first data unit should be received in time; and

- repeating steps g), h) and i) for each subsequent data unit of the data signal in turn.

84. (New) A computer program product according to claim 49, comprising computer readable program means for estimating an expected reduced link transmission rate in advance.

85. (New) A computer program product according to claim 49, comprising computer readable program means for estimating an expected reduced link transmission rate based on the behaviour of the transmission link.

86. (New) A computer program product according to claim 49, comprising:

- computer readable program means for re-ordering the data signal to produce re-ordered data signals for several alternative transmission rates; and
- computer readable program means for switching to a re-ordered data signal better suited to a lower transmission rate if problems are encountered due to pauses in playback at the client.

87. (New) A computer program product according to claim 49, comprising computer readable program means for checking the progress of transmission and/or for checking the progress of playback at the client during transmission, and computer readable program means for adjusting the sequence of data units dynamically whilst transmission is occurring.

88. (New) A computer program product according to claim 49, further comprising computer readable program means for replacing some of the primary data units with secondary data units, before changing the order of the primary and secondary data units.

89. (New) A computer program product according to claim 49, wherein the computer readable program means for changing the order of the primary and secondary data units is arranged to re-order the data units of a data signal for transmission over a transmission link having a data transmission bandwidth that would otherwise be insufficient for transmitting the data signal.

90. (New) A computer program product according to claim 49, wherein the computer readable program means for changing the order of the primary and secondary data units is arranged to re-order the data units of a data signal for transmission over a transmission link, so as to make a certain portion of an available bandwidth available for transmission of other data.

91. (New) A re-ordering device according to claim 54, wherein the re-ordering device is arranged to:

- calculate an average bit-rate for the data signal, said average bit-rate comprising an average bit-rate for the primary data units and an average bit-rate for the secondary data units;
- calculate a buffering time required at the client for full quality playback of the data signal at the client when

the data units are transmitted over the transmission link from the server to the client in the original data unit order at a full transmission rate equal to the average bit-rate of the data signal, full quality playback of the data signal at the client occurring when all of the primary data units and all of the secondary data units in the data signal are received at the client in time to be played back at their scheduled playback times;

- calculate a buffering time required at the client for reduced quality playback of the data signal at the client, when the data units are transmitted over the transmission link from the server to the client in the original data unit order at a reduced transmission rate less than the average bit-rate of the data signal, reduced quality playback of the data signal at the client occurring when all of the primary data units are received at the client in time to be played back at their scheduled playback times and some or all of the secondary data units are received at the client too late to be played back at their scheduled playback times;

- a). shift the position of each primary data unit in the sequence of data units towards the beginning of the sequence of data units, so that where a primary data unit is preceded by a secondary data unit in the sequence of data units, the positions of the primary and secondary data units are exchanged, thereby producing a re-ordered data signal with a modified data unit order different from the original data unit order;

- b). repeat the step of calculating the buffering time required at the client for full quality playback of the data signal assuming the data units are transmitted over the transmission link from the server to the client in the modified data unit order;
- c). repeat the step of calculating the buffering time for reduced quality playback of the data signal at the client assuming the data units are transmitted from over the transmission link from the server to the client in the modified data unit order;
- repeat steps a), b) and c) until the buffering time required for full quality playback at the client is greater than or equal to the buffering time for reduced quality playback of the data signal at the client.

92. (New) A re-ordering device according to claim 91, wherein the re-ordering device is arranged to calculate the buffering time for full quality playback of the data signal at the client by:

- d). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate of the data signal;
- e). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data to determine whether the

first data unit will be received at the client in time to played back at its scheduled playback time;

f). if the first data unit will be received at the client too late to be played back at its scheduled playback time, increasing the buffering time so that the first data unit should be received in time; and

- repeating steps d), e) and f) for each subsequent data unit of the data signal in turn.

93. (New) A re-ordering device according to claim 91, wherein the re-ordering device is arranged to calculate the buffering time for reduced quality playback of the data signal at the client by:

g). determining a time by which the first data unit of the data signal will be ready for playback at the client assuming that the transmission link has a constant transmission rate equal to the average bit-rate for the primary data units plus a certain percentage of the average bit-rate for the secondary data units;

h). comparing the time when the first data unit will be ready for playback at the client with the scheduled playback time of the first data unit to determine whether the first data unit will be received at the client in time to be played back at its scheduled playback time;

i). if the first data unit will be received at the client too late to be played back at its scheduled playback time,

increasing the buffering time so that the first data unit should be received in time; and

- repeating steps g), h) and i) for each subsequent data unit of the data signal in turn.

94. (New) A re-ordering device according to claim 54, wherein the re-ordering device is arranged to estimate an expected reduced link transmission rate in advance.

95. (New) A re-ordering device according to claim 54, wherein the re-ordering device is arranged to estimate an expected reduced link transmission rate based on the behaviour of the transmission link.

96. (New) A re-ordering device according to claim 54, wherein the re-ordering device is arranged to re-order the data signal to produce re-ordered data signals for several alternative transmission rates.

97. (New) A re-ordering device according to claim 54, wherein the re-ordering device is arranged to adjust the sequence of data units dynamically whilst transmission is occurring.

98. (New) A re-ordering device according to claim 54, wherein the re-ordering device is arranged to re-order the data units of a data signal for transmission over a transmission link having a data transmission bandwidth that would otherwise be insufficient for transmitting the data signal.

99. (New) A re-ordering device according to claim 54, wherein the re-ordering device is arranged to re-order the data units of a data signal for transmission over a transmission link so as to make a certain portion of an available bandwidth available for transmission of other data.

100. (New) A client for receiving a data signal, the data signal comprising a sequence of data units including primary data units and secondary data units, each of the primary and secondary data units having a scheduled playback time at the client, receipt of the primary data units at a client in time to be played back at their scheduled playback times providing pause-less playback of the data signal at the client, receipt of the secondary data units at the client in time to be played back at their scheduled playback times improving the quality of the data signal played back at the client, an order of the primary and secondary data units in the sequence of data units having been changed with respect to an original data unit order by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data unit order in which the primary data unit precedes the secondary data unit in the sequence of data units, thereby increasing the likelihood that the primary data unit will be received at the client in time to

be played back at its scheduled playback time and decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time.

101. (New) A method of receiving a data signal, the data signal comprising a sequence of data units including primary data units and secondary data units, each of the primary and secondary data units having a scheduled playback time at a client, receipt of the primary data units at the client in time to be played back at their scheduled playback times providing pause-less playback of the data signal at the client, receipt of the secondary data units at the client in time to be played back at their scheduled playback times improving the quality of the data signal played back at the client, an order of the primary and secondary data units in the sequence of data units having been changed with respect to an original data unit order by exchanging a secondary data unit that precedes a primary data unit in the original data unit order with the primary data unit so as to produce a re-ordered data signal with a modified data unit order in which the primary data unit precedes the secondary data unit in the sequence of data units, thereby increasing the likelihood that the primary data unit will be received at the client in time to be played back at its scheduled playback time and decreasing the likelihood that the secondary data unit will be received at the client in time to be played back at its scheduled playback time.